City of Albuquerque Public Works Department

Water Resources Strategy Implementation

City of Albuquerque

Drought Management Strategy

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Submitted by

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In Association With

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Contents

Introduction

The City of Albuquerque established a Drought Management Task Force to develop and finalize a Drought Management Strategy in Resolution 137, Enactment Number 4-2001, January 10, 2001 (see Appendix A). The resolution calls for a strategy containing four different drought severity levels, with each level containing increasingly stringent measures to reduce demand on the City's municipal water system. The four-phased approach should consist of

Drought Advisory:	Voluntary Conservation
Drought Watch:	Mandatory Conservation
Drought Warning:	Mandatory Conservation
Drought Emergency:	Water Rationing

The resolution also stipulates that drought-related conservation measures will apply when certain thresholds related to precipitation, surface water availability, and conservation program progress are reached. The strategy should also suggest how measures will be implemented and by whom.

In meetings held between March 2001 and September 2001, four alternative strategies were discussed by the Drought Management Task Force. This report presents a summary of the Task Force's recommended strategy and provides background information for the proposed Drought Management Strategy Ordinance. The Drought Management Strategy also will be submitted to the Office of the State Engineer as part of the City's permit applications for use of surface water pursuant to implementation of the Albuquerque Water Resources Management Strategy.

This Drought Management Strategy fulfills the intent of R-137 by designating four levels of increasing severity: Drought Advisory, Watch, Warning and Emergency. Drought-stage thresholds will be based on excess pumping of the aquifer, which reflects the combined effects of precipitation, surface water availability, and conservation program progress.

The Drought Management Task Force included members that represent a broad spectrum of community interests as recommended in R-137.

Name	Affiliation
Richard Barish	Sierra Club
Charles Barnhart	Albuquerque Economic Forum
Stephen Charnas	Greater Albuquerque Chamber of Commerce
Norman Churchill	Water Resources Customer Advisory Committee (League of Neighborhoods, East Side)
Sandy Doyle	City of Albuquerque, Public Works Finance Manager
Aileen Gatterman	League of Women Voters
William Brooks Gauert	Coalition of Neighborhoods
Martin Haynes	Water Resources Customer Advisory Committee

Staff	Affiliation
John Stomp	Water Resources Manager, Public Works
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Consultants	Affiliation
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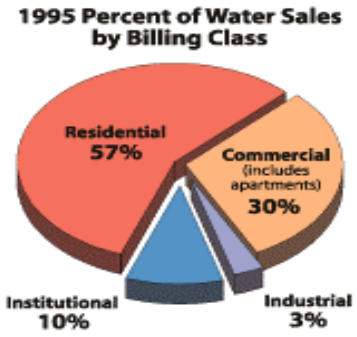
Background

Albuquerque now supplies about 110,000 acre-feet / year of water to more than 450,000 customers in the metropolitan area. Water use is distributed as indicated in the pie chart below. The aquifer underlying the Middle Rio Grande Valley is currently the utility's sole source of water. At present, over half the water pumped from the aquifer each year is not replenished.



The City adopted an ambitious Water Conservation Program in 1995 with the goal of reducing per capita water use by 30 percent to 175 gallons / person / day by 2004. As of year-end 2000, conservation has reduced use by about 23 percent, which means that the program is on track for meeting the goal.

In 1997, the City of Albuquerque adopted a comprehensive Water Resources Management Strategy to assure a safe and sustainable water supply for its customers to the year 2060. Its primary goal is to preserve the aquifer and to treat the nonrenewable portion as a *long-term* drought reserve, recognizing that any water taken out would have to be restored when possible. Of course, even in times of drought the aquifer must be protected to avoid compaction and land subsidence. The best approach is to reduce the water taken out rather than rely on aquifer re-injection.

Implementation of the Water Resources Strategy, now in progress, is diversifying the water sources used. Most notably, major projects are under way to divert about 94,000 acre-feet of water—including the City's San Juan-Chama Diversion Project water, which will be added to the Rio Grande upstream of the City—for drinking water purposes. The City's San Juan-Chama Diversion Project water is delivered annually. This surface water is scheduled to be available for drinking water use at the end of 2005.

In addition, the Water Resources Strategy calls for almost 7,000 acre-feet of recycled and reclaimed water to be used for irrigation and industrial purposes. Recycling industrial water on the Northside provides an average of about 1,000 acre-feet / year. Reclaiming nonpotable surface water will make it possible to add almost 3,000 acre-feet / year. Recycling water from the Southside Water Reclamation Plant—which treats all of Albuquerque's wastewater—will provide almost 2,500 acre-feet / year. Use of lower quality recycled and reclaimed water preserves high quality water for use as drinking water.

Longer term, the Water Resources Strategy calls for the use of shallow ground water for irrigation in the central part of the City and for aquifer storage / recovery, which also has the potential to provide additional water reserves for use during drought.

The large-scale introduction of surface water means pumping from the aquifer can be reduced to renewable levels, at least during nondrought periods.

The definition of drought in Albuquerque relates to the supply of surface water and the amount of ground water pumped during dry, high-demand periods of drought. Because drought has

its greatest impact in the summer and early fall (the highest water demand time of the year) drought mitigation focuses on this time period.

This report outlines recommendations by the Drought Management Task Force on how the City of Albuquerque should define drought and respond with water saving measures. First, a brief description of related state and City policies are presented, followed by specific recommendations for a Drought Management Strategy.

Related Policies

State of New Mexico Drought Management Task Force

The State of New Mexico has established its own Drought Task Force through Executive Order 98-41. The New Mexico Drought Task Force has an active monitoring and impact assessment work group that tracks and identifies drought conditions throughout the state. The Executive Order also encourages municipalities to "identify their vulnerabilities to drought, prepare for and, where possible, take steps to minimize the impacts of drought before it occurs."

The role of the statewide New Mexico Drought Task Force (DTF) is to oversee the monitoring of drought conditions and implementation of drought-related activities in the State of New Mexico. They established a Drought Management Plan for the state that can be viewed at http://weather.nmsu.edu/drought/index.htm. Drought conditions are posted on the website for reference by New Mexico communities. In addition to the DTF, two work groups augment the program.

The Monitoring Work Group (MWG) issues a Quarterly Drought Monitoring/Status Report briefly summarizing climatic conditions in the state. When the MWG determines that the state has entered various stages of drought, it will issue the appropriate "Drought Notices" and monthly "Drought Monitoring/Status Reports."

The Impact Assessment Work Group monitors and assesses the current and potential impacts of impending or ongoing drought on the state's economy, environment and natural resources, and initiates appropriate drought responses. For purposes of identifying drought conditions in the state, Albuquerque is in Climate Zone 5.

The MWG uses the following indices to assist in the determination of drought status:

- Palmer Drought Severity Index
- Surface Water Supply Index
- Standardized Precipitation Index

Albuquerque has the option to rely on the declaration of drought stages by the New Mexico Drought Task Force. However, the DTF's definition of drought stages does not account for conditions specific to Albuquerque. The Albuquerque Drought Management Task Force believes that in Albuquerque, the major objective should be to protect the drought reserve in the aquifer, so well-pumping data more accurately describes the seriousness of the drought impact on the water supply. Therefore, the City, together with the Task Force and the Water Resources Customers Advisory Committee, developed a process to independently evaluate conditions and declare drought stages.

City of Albuquerque Water Waste Policy

Water waste is defined as any water, other than natural precipitation, that flows or sprays into a public right-of-way, city storm drain, or adjacent private property. Water waste is prohibited by the Water Conservation Landscaping and Water Waste Ordinance. Water waste enforcement staff conduct inspections and assess fines for violations. In 2000, 427 notices of violations were issued. In addition, 224 warnings were issued for watering between the hours of 10:00 a.m. and 6:00 p.m. The Water Waste Ordinance sets a fee schedule (currently being reviewed by City Council for an increase, as seen in Appendix B) in Albuquerque Code of Ordinances, Section 6-1-1-99. Current water waste citation fees are as follows:

1. First observed violation — $20
2. Second observed violation — $50
3. Third through fifth observed violation — $100 per violation
4. Sixth and additional observed violation — $200 per violation
5. Eighth or more observed violation — application of flow restriction device at meter

The City also has authority to enforce its landscaping and irrigation provisions. Section 6-1-1-99 (C) includes the following language: "Any responsible party who violates [sections relating to landscape design, planting and irrigation regulation provisions] shall be deemed guilty of a misdemeanor, and upon conviction thereof, shall be punished by a fine not to exceed $500 and / or imprisonment for a period not to exceed 90 days."

City of Albuquerque Water Rates

Current water rates apply a fixed monthly charge for water service. As of May 2001, the commodity charge of $1.042 is charged per unit of water used. One unit equals 100 cubic feet or 748 gallons of water. On an annual basis, a "winter mean" water usage for the months of December, January, February, and March is calculated by meter size. For residential accounts, sizes 1 through 4, each unit exceeding 200 percent of the winter mean is assessed a surcharge of $0.21 per unit from April through October (proposed to increase, as seen in Appendix C).

Currently, the winter mean for residential meter size 1 is 8 units / month (about 6,000 gallons). Thus, twice the winter mean usage is 16 units / month (about 12,000 gallons); 150 percent of winter mean usage is 12 units / month (about 9,000 gallons). For those customers not using residential meters sizes 1 though 4, the winter average is based on their actual use the previous December through March. Currently, the 200 percent threshold and surcharge is the same for all customers – residential, commercial, industrial or institutional ($0.21 for each unit of 748 gallons).

Variances

Current policy in the Code of Ordinances provides customer-specific variances in cases of hardship or special conditions. A variance is granted only for reasons of severe economic hardship, medical hardship, or for a legitimate public health concern.

Enforcement

Enforcement of a Drought Management Strategy could follow current policies related to water waste and landscape/irrigation regarding fines and responsible action. Enforcement could be performed by water waste personnel. Other cities have also supplemented enforcement staff during drought by training and re-directing other staff to these tasks. The City of Albuquerque may want to consider such temporary re-direction of staff efforts during declared drought stages.

Alternative Approaches Reviewed by Task Force

Initially, the Drought Management Task Force reviewed drought management measures commonly used throughout the country, particularly those in use in arid cities similar to Albuquerque. The project team assembled three alternative drought management strategies based on a compilation of indicators ("Palmer Drought Severity Index", stream flow, and conservation program progress) to trigger drought stages.

Upon review, the Task Force expanded this approach to include thresholds based on the variance between actual water use from planned water use. This quantified variance was then matched with conservation response measures designed to provide an approximate equivalent for savings. The direct relationship between measures and target savings helps the public understand the reductions called for.

Objectives of the Drought Management Strategy

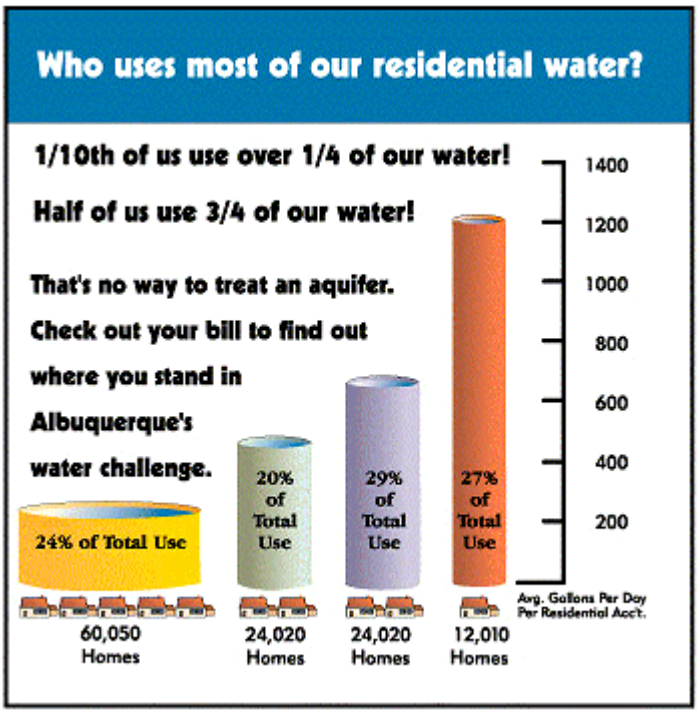
The recommendations in this report reflect the following objectives developed by the Drought Management Task Force:

- Create a drought management strategy that does not merely copy other cities' approaches but specifically addresses Albuquerque's unique situation.
- Define drought thresholds based on local, understandable, and scientifically based information – such as historical and predicted hydrological trends, weather patterns, and probabilities of drought severity levels.
- Set drought stage levels at thresholds that are proportional to the excess demands placed on the aquifer.
- Recommend water saving measures that have demonstrable results and match the shortage.
- Create an implementation scheme that does not move the City in and out of drought stages on a monthly basis.
- Reserve severe water restrictions for real emergencies.
- Make it feasible to save enough water in the "Advisory" or early drought stages to prevent going into further and more stringent stages.
- Make it easy for the public to understand. Distinguish drought conditions from the general water conservation message. Create a "drought index" to communicate the severity of the situation.

Targeting Drought Response Measures

As stated earlier, residential customers account for almost 60 percent of production by the water utility. In summer months, most water consumption is for outdoor uses. Hence, outdoor uses are the primary targets of recommended water saving measures, (though customers will also be provided with information on indoor water savings).

Among residential customers in 1996, about one-half of households accounted for 75 percent of use. In other words, half of all households on average use three times as much water as the other half. Moreover, 10 percent of households account for over 25 percent of residential water use. These higher-volume users represent a logical target for additional conservation during drought periods. A special outreach program for these ratepayers may yield increased savings.



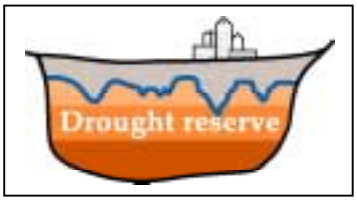
Because industrial and commercial water use accounts for a relatively small portion of the total, the potential for savings is correspondingly less. Landscape watering restrictions and other measures will apply equally to them. However, no specific additional measures have been developed for these customer classes.

City services account for approximately 6 percent of metered usage. The City has taken steps to save water within City-owned facilities. Visible efforts by the City to conserve water in its facilities during periods of drought will demonstrate commitment to make the same effort that is asked of citizens. Specific-drought response measures in this Strategy likewise apply to City properties.

As residences cut back on water use, people may depend more on public green spaces for recreation. For that reason, the target reduction of public uses, such as parks, athletic fields and golf courses is designed to preserve these facilities, although at a lower level of water use.

The City's Conservation Office tracks water consumption by ratepayer groups (e.g., residential, industrial, etc). Conservation program progress is tracked monthly. If the weather is drier than normal and ratepayers respond by consuming more water, the Conservation Office will be able to see which groups have increased their use and can target specific conservation messages accordingly.

Drought Stages Defined as Excess Pumping Levels



A primary goal of the Water Resources Strategy is to protect the aquifer from permanent damage caused by over-pumping and instead to create and preserve a ground-water drought reserve. When San Juan-Chama water is fully utilized in the City's water supply, ground-water pumping will be reduced from the current 110,000 acre-feet / year to around 20,000 acre-feet per year in the short run. Over time, pumping will increase as demand increases. By 2020, the City will again be pumping beyond renewable levels. By 2040, it is projected that we will be back to where we are today and the City will need to find other water sources to avoid permanent damage to the aquifer.

The drought stages proposed here would be implemented when ground-water pumpage exceeds the projected normal pumpage by the targeted amount. This could be "triggered" by the unavailability of surface water, excess usage by customers, hot and dry weather causing an increase in demand, or (most likely) a combination of these factors. Unavailability of surface water would have by far the most significant effect in causing additional ground-water use. Greater-than-projected pumpage can be viewed as an overdraft on a limited underground water account. To protect the aquifer, drought measures are targeted to achieve savings equal to the deficit (overdraft) that would otherwise occur.

When ground-water pumping exceeds target levels, drought will be declared by the Mayor or his / her designee. First, the public will be asked to voluntarily reduce water use. If drought conditions continue and pumping further increases, subsequent drought stages will be declared, and more serious and mandatory measures will be implemented.

If voluntary efforts to reduce water consumption are successful, the later, more severe measures may never need to be implemented. The shortfall of later stages is based on failure to respond to the call for conservation in earlier measures (along with the bad luck of a long-term drought).

Albuquerque is subject to cycles of drought. Multiple-year droughts, as experienced in the 1950s, are destined to re-occur. In this situation, the aquifer may be relied upon for many years. What happens if it is depleted before that time? Years of careless use of aquifer water may lead to serious damage and land subsidence at a time when no other water sources may be available.

After surface water is added to the drinking water supply (scheduled to occur by the end of 2005), the City will rely on nature to replenish some of the water that has been mined from the aquifer. To date, ground-water levels have dropped as much as 180 feet. Only time will tell for certain what portions of the natural ground-water flows can be restored and to what levels.

Land subsidence may occur when the water table drops 260 feet. Because Middle Rio Grande ground-water users have already reduced the level of the water table so drastically, the remaining water in the aquifer should be protected. Conservation has proved to be one of the most reliable and least expensive means of coping with drought. If ground water is to be preserved as a drought reserve for future generations, deficit pumping of aquifer water needs to be prevented whenever possible. Over-pumping that does occur should trigger plans for replacing the "borrowed" water gallon for gallon.

This explains why the Drought Management Strategy must put measures in place to prevent demand from causing excessive ground-water pumping, even during a drought. The Strategy as outlined below sets the goal of reducing demand during drought to levels consistent with preserving a drought reserve for generations to come.

Proposed Drought Stage Levels

Drought stages for Albuquerque will be triggered by increasing pumping deficit levels. The first drought declaration will be a "Drought Advisory" containing voluntary water-saving suggestions. If the drought continues and pumping of nonrenewable ground water continues to increase, Drought Stages I, II, and III will be declared. These drought stages contain increasingly stringent mandatory drought response measures.

How were drought stages established?

A computer model took historic weather, hydrological, and pumping information and calculated what would happen in normal and dry years when Albuquerque relies on surface water. When this strategy is implemented, the Water Utility will map out a schedule of monthly target well pumping levels based on total consumption of 175 gallons / person / day, assuming that the surface water supply is fully available. This scheduled pumping rate was correlated with surface water availability in normal and dry years. In this way, we can see how pumping might exceed scheduled rates if surface water is scheduled for use, but is not available. The results showed that pumping would have greatly exceeded planned rates in dry years (e.g., 1972), creating excessive ground-water withdrawal. Such excess withdrawals act as both the trigger for drought stages and the target for water savings.

How were drought response measures developed?

The Task Force directed staff and consultants to develop packages of drought response measures that could counteract the projected excess demands on the aquifer. Drought response measures and their associated savings were based on water use data and the experience of the Albuquerque Water Conservation Program. The savings levels are estimates. The City will only be able to determine if these estimates and drought response measures achieve the predicted results through implementation. This means that in the future City staff may need to recommend changes to the drought response packages in accordance with actual results achieved. Therefore, a 5-year review and evaluation is called for in the implementation section of this report. If major changes to this Strategy are recommended, the proposal would be brought to City Council as an amendment to the Drought Management Strategy Ordinance.

Recommended Drought Stages and Corresponding Drought Response Measures

As the City transitions to surface water for a major portion of its water supply, it plans to reduce ground-water pumping to renewable levels. Initially pumping can be reduced to around 20,000 acre-feet / year. Because the surface water supply will remain constant at 94,000 acre-feet / year, over time ground-water pumping will need to increase to meet increasing demands. The Water Resources Strategy shows that using this approach, the City will have a sustainable supply until around 2040, when additional supplies will be needed. This assumes that surface water supplies owned are fully available and that conservation goals are fully achieved.

During drier than normal conditions per capita water demand may increase, and during drought conditions surface water may not be available. These two conditions combined would result in increased ground-water pumping to meet increased demands and make up for decreased surface water supplies. This increased ground-water pumping represents borrowing from the ground-water drought reserve and thus serves as the metric for determining the severity of the drought conditions.

Normal well pumping levels can be plotted out on a monthly basis. When monthly trends indicate that pumping is exceeding the planned schedule, appropriate stages of drought will be declared.

Excess pumping will define drought stages as follows:

Drought Stage	Drought Level	Drought Response	Excess Aquifer Pumping
	"Drought Advisory"	Voluntary Conservation	10,000 acre-feet/year
Stage I	"Drought Watch"	Mandatory Conservation	20,000 acre-feet/year
Stage II	"Drought Warning"	Mandatory Conservation	30,000 acre-feet/year
Stage III	"Drought Emergency"	Water Rationing	40,000 acre-feet/year *OR* 30,000 acre-feet for 2+ yrs.

Drought Declaration Procedures

Upcoming surface water availability may be assessed using snow pack in the San Juan and Chama Basins, as well as stream flow at gauges in the Rio Chama and Rio Grande. By April 1st of each year, the Mayor or his/her designee will report these projections of potential drought conditions to the City Council.

The report will include information on whether continued drought conditions would trigger a more serious drought stage. The Mayor or his/her designee will be responsible for monitoring water availability, pumping and drought conditions, and for declaring drought stages and associated measures.

A review of hydrologic data and aquifer pumping trends indicate the predicted frequency of various levels of drought. In any given year, there is an estimated:

- 30 percent chance of more than **10,000 acre-feet** of excess pumping (i.e., this amount of excess pumping is expected to occur about once every 3.3 years)
- 20 percent chance of more than **20,000 acre-feet** of excess pumping (i.e., this amount of excess pumping is expected to occur about once every 5 years)
- 10 percent chance of about **30,000 acre-feet** of excess pumping (i.e., this amount of excess pumping can be expected to occur about once every 10 years)
- 2 percent chance of more than **30,000 acre-feet** of excess pumping for more than 1 consecutive year or **40,000 acre-feet in a single year** (i.e., this amount of excess pumping is expected to occur in consecutive years about once every 50 years)

These excess pumping levels thus determine the drought-stage levels. They create a target demand reduction level to be achieved though water-saving measures.

If the aquifer is viewed as a water (bank) account, the potential overdraft would be avoided by cutting back on consumption (spending) by implementing drought-response measures. The public education effort will include a "Drought Index" that can be easily reported and understood to communicate the drought severity and corresponding conservation measures needed to offset it.

The proposed packages of drought-response measures follow. These packages include a recommended combination of measures that are *estimated* to achieve the target level of savings for each stage. When packages include a number of measures, the combined savings are reduced by a factor of around 75 percent, because savings resulting from measures may overlap and therefore diminish total results.

When Would Drought Have Triggered These Measures in the Past?

The definitions of drought stages proposed here reflect more serious water shortages than those that occur routinely every few years. For example, one of the only times that even the minimal and voluntary measures of a Drought Advisory would have been invoked in the past 20 years was during 1996.

A drought period that would have triggered the more advanced stages of the proposed strategy occurred in 1976. In that year a Drought Watch (Stage I, the first imposition of mandatory conservation) would have been declared. In 1972, a Drought Warning (Stage II, calling for more stringent mandatory conservation) would have been declared.

The worst drought in memory for most New Mexicans was the 1950s drought, during which precipitation was at low levels for a decade. The driest years were 1954 though 1956. The proposed Drought Management Strategy would have declared a Drought Warning (Stage II) in 1954 and a Drought Emergency (Stage III) in 1955 and 1956.

The more consistently abundant precipitation since the 1950s drought may indicate that the state is "due" for a drought soon, although no definite prediction can be made.

Recommended Packages of Drought Response Measures to Achieve Target Demand Reductions

Drought Advisory: 10,000 acre-feet /year; equivalent to 9 percent of current production

Increase public education regarding voluntary measures	**6 %**	6,900
Recommend voluntary watering 3 days / week	**3 %**	3,500
Total	**9 %**	10,400 ac-ft / yr

Drought Watch— Stage I: 20,000 acre-feet/year; equivalent to 17 percent of current production

Increase public education	**4 %**	4,600
Double surcharge	**6 %**	6,900
Reduce watering to 3 days per week	**6 %**	6,900
Institutional turf target reduction of 15 percent	**1.5%**	1,700
Restrict water use on impervious surfaces	**1 %**	1,150
Eliminate curbside car washes	**1 %**	1,150
Provide more how-to specifics: min. watering of grass, sprinkler adjustment	**1** %	1,150
Double water waste fees – apply to all prohibited uses	**2 %**	2,300
No aesthetic water uses (e.g., fountains, refill ponds)	**0.5**%	575
Advise about pool covers		
Combined effect equals 75 percent of total	**17 %**	20,000 ac-ft / yr

Drought Warning – Stage II: 30,000 acre-feet/year; equivalent to 26 percent of current production

Increase public education	**1 %**	1,150
Triple surcharge	**12 %**	13,800
Reduce watering to 2 days per week	**12 %**	13,800
Institutional turf target reduction of 25 percent	**2.5%**	2,900
No planting of new turf or landscape	**1 %**	1,150
Restrict water use on impervious surfaces	**1 %**	1,150
Require pool covers	**0.5%**	575
Double water waste fees - apply to all prohibited uses	**2 %**	2,300
Eliminate curbside car washing	**1 %**	1,150
Ban continuous bleed-off swamp coolers	**1 %**	1,150
No aesthetic water uses (e.g., fountains, refill ponds)	**0.5**%	575
Combined effect equals 75 percent of total	**26 %**	30,000 ac-ft / yr

Drought Emergency – Stage III: 40,000 acre-feet for one year, or 30,000 acre-feet/year for more than one year; equivalent or exceeding 26 percent of current production

Increase public education	**1 %**	1,150
Triple surcharge	**12 %**	13,800
Reduce watering to 2 days per week	**12 %**	13,800
Institutional turf target reduction of 25 percent	**2.5%**	2,900
No planting of new turf or landscape	**1 %**	1,150
Restrict water use on impervious surfaces	**1 %**	1,150
Require pool covers	**0.5%**	575
Double water waste fees - apply to all prohibited uses	**2 %**	2,300
Eliminate curbside car washing	**1 %**	1,150
Ban continuous bleed-off swamp coolers	**1 %**	1,150
No aesthetic water uses (e.g., fountains, refill ponds)	**0.5**%	575
Combined effect equals 75 percent of total	**26 %**	30,000 ac-ft / yr

If 26 percent savings are not achieved through above measures, additional measures can be selected from the "menu of options."

If 40,000 acre-feet / year is needed, draw from "menu of options" of additional measures to of additional measures to increase estimated savings	**35 %**	40,000 ac-ft / yr

MENU OF OPTIONS TO DRAW FROM IF MORE WATER SAVINGS ARE NEEDED

Measure	Estimated Additional Savings Over Stage II (Warning) (1% Reduction of Water Production	Est. Additional Savings Over Previous Stage	Est. Savings as a Stand-Alone Measure	
			Percent	(ac-ft/yr)
Reduce surcharge threshold by 25%			2%	2,300
Reduce surcharge threshold by 50%			3%	3,500
Quadruple Surcharge	6%	7,000 ac-ft/yr	18%	20,700
Triple water waste fees	1%	1,150 ac-ft/yr	3%	3,500
Reduce watering to one day per week	12%	13,800 ac-ft/yr	24%	27,600
Increase leak detection services			2%	2,300
Require spot watering (water trees and shrubs using hose nozzle attachment or bucket); reduce plant nursery watering, reduce or eliminate fleet washing; reduce all water intensive processes as possible (i.e. power-washing, construction, etc.			1 to 4%	1,150 -4,600
Increase effort to target large water users in all sectors (e.g., initiate or follow up on previous water audits, monitor savings and call homeowners to encourage progress, monitor usage and savings to encourage target users and congratulate on progress)			2%	2,300
Provide water conservation seminars to landscape maintenance firms			2%	2,300
Expand school programs to educate on drought			3%	3,500
Expand education on adjusting sprinklers and reducing watering after rain (applicable prior to Stage 3)			1%	1,150
Increase rebate packages to include water saving appliances such as dishwashers, point-of-use hot water heaters			2%	2,300

ESTIMATED WATER SAVINGS ASSOCIATED WITH DROUGHT RESPONSE CONSERVATION MEASURES

Measure	Savings as % Reduction of Water Production	Estimated Savings	Estimated Savings by Category of Use
Reference: Total Water Production in 2000	100%	115,000 ac-ft/yr	
Increased public education during voluntary stages (including extra promotion of rebates)	6%	6,900 ac-ft/yr	15% of summer use by all customers
During Stage 1	4%	4,600 ac-ft/yr	
During Stages 2 and 3	1%	1,150 ac-ft/yr	
Adjust Surcharge Thresholds			
Lower surcharge threshold by 25%	2%	2,300 ac-ft/yr	2% of residential and commercial use in excess of winter average
Lower surcharge threshold by 50%	3%	3,500 ac-ft/yr	3% of residential and commercial use in excess of winter average
Increase Surcharge			
Double surcharge ($0.48/unit to $0.96/unit)	6%	6,900 ac-ft/yr	20% of residential and commercial use in excess of winter average
Triple surcharge ($0.48/unit to $1.44/unit)	12%	13,800 ac-ft/yr	30% residential and commercial use in excess of winter average
Quadruple surcharge ($0.48/unit to $1.92/unit)	18%	20,700 ac-ft/yr	40% residential and commercial use in excess of winter average
Increase Water Waste Fines Proposed fine per violation: 1st = $20; 2nd = $50; 3rd = $100; 4th = $150; 5th = $200; 6th = $300; 7th = $400; 8th = $500			
Double water waste fines	2%	2,300 ac-ft/yr	
Triple water waste fines	3%	3,500 ac-ft/yr	
Quadruple water waste fines	4%	4,600 ac-ft/yr	

ESTIMATED WATER SAVINGS ASSOCIATED WITH DROUGHT RESPONSE CONSERVATION MEASURES (CONTINUED)

Measure	Savings as % Reduction of Water Production	Estimated Savings	Estimated Savings by Category of Use
Outdoor Watering Restrictions			
Voluntarily Reduce Watering To 3 Days/Week	3%	3,500 ac-ft/yr	½ of mandatory savings
Watering no more than 3 Days/Week – Mandatory	6%	6,900 ac-ft/yr	15% reduction in outdoor water use
Watering no more than 2 Days/Week – Mandatory	12%	13,800 ac-ft/yr	30% reduction in outdoor water use
Watering no more than 1 Day/Week – Mandatory	24%	27,600 ac-ft/yr	60% reduction in outdoor water use
Target Percentage Reductions for Large Turf Institutional Customers (Schools, Parks, Golf Courses)			This sector uses 9%of total water production. They are assigned target reductions without parameters of # days per week of watering
15% reduction	1.5%	1,700 ac-ft/yr	Target savings of 15% (vs. 25%)
25% reduction	2.5%	2,900 ac-ft/yr	Target savings of 25% (vs. 30%) to avoid killing plantings/turf on public use areas
30% reduction	3%	3,500 ac-ft/yr	Target savings of 30% (vs. 45%) to selectively preserve plantings and turf on public use areas
40% reduction	4%	4,600 ac-ft/yr	Target savings of 40% (vs. 45%) to selectively preserve plantings and turf on public use areas on public use areas
No Planting Of New Turf Or Landscape	0.8%	900 ac-ft/yr	This would be equivalent to foregoing 2% annual increase in residential outdoor use.
Restrictions on Aesthetic Water Uses			This use accounts for approximately 1% of total water production
Restrict topping off pools	.25%	300 ac-ft/yr	
Cover Pools	.5%	600 ac-ft/yr	
Other (e.g. fountains)	.25%	300 ac-ft/yr	
Car Washing Restrictions			This use accounts for approximately 2% of total production
Restrict car washing, hose sweeping, etc	1%	1,100 ac-ft/yr	
Eliminate car wash fundraisers and reduce car washing on dealer lots	1%	1,100 ac-ft/yr	

ESTIMATED WATER SAVINGS ASSOCIATED WITH DROUGHT RESPONSE CONSERVATION MEASURES (CONTINUED)

Measure	Savings as % Reduction of Water Production	Estimated Savings	Estimated Savings by Category of Use
Air Conditioning Restrictions			This use accounts for approximately 5% of total production
Ban continuous bleed-off swamp coolers	1%	1,100 ac-ft/yr	3,900 gal/season is typical usage for swamp coolers. Continuous bleed-off use 13,000 gal/season. An est. 3% of 133,000 accts. use the "bleed-off" coolers.
Reduce swamp cooler use as possible	0.2%	200 ac-ft/yr	10% reduction of 5% of summer water use
Notes: One acre-foot = 325,852 gallons = 435.6 "units" = 43,560 cubic feet One unit = 748 gallons = 100 cubic feet			

Education Features

Drought Stage Usage Reductions and How to Achieve Them

At each drought level, the City would set forth a conservation goal in terms of gallons of indoor use and outdoor use reduced per day. The City would also provide "how-to" information to match water reduction objectives for each drought stage.

The amount of savings needed during a drought will depend on how successful ratepayers have been at achieving water conservation in general. In 1994, when the water conservation program was initiated, Albuquerqueans were using 250 gallons per person per day. The City adopted the goal to reduce per capita use to 175 gallons by 2004. (In 2001, per capita use was reduced to 204). This number refers to Citywide usage, including gallons used for public facilities and parks, as well as other public uses. The usage per residence is a smaller number. This number is useful as a reference point for households to know how much water they can save in their home. The per capita use goal of 175 translates to 128 gallons per person per day in the home. The current per capita use of 204 translates to 144 gallons per person per day in the home.

The following tables show the amount of water each Albuquerque resident will be asked to save during each drought stage. The difference in the daily savings needed between the two tables is based on whether inroads have already been made in day-to-day conservation.

If the 30 percent conservation goal (128 per residence per day) has been achieved, the additional savings needed during drought are estimated to be as follows:

Drought Stage	Total Consumption Goal in the Home (in gal/person /day)	Outdoor Savings Needed (in gal/person/day)	Indoor Savings Needed (in gal./person/day)
Advisory	119	6	3
Watch	111	9	7
Warning	102	16	9
Emergency	94	21	12

If residential water use remains at current levels (144 per person per day), the additional savings needed during drought are estimated to be as follows:

Drought Stage	Total Consumption Goal in the Home (in gal /person /day)	Outdoor Savings Goals (in gal/person/day)	Indoor Savings Goals (in gal./person/day
Advisory	119	19	6
Watch	111	22	10
Warning	102	29	12
Emergency	94	34	15

Educational materials could be produced to communicate messages of what people can do to save the target number of gallons per day. School outreach programs could include contests and challenges to find water savings in their home. Downloadable information could be available on the City's website.

Implementation Features

- The Drought Declaration will be issued by the Mayor or his/her designee.
- Drought stages may be based on projected stream flow or actual deviation of pumping rates from monthly targets. Stages will be determined on a monthly basis.
- All measures will be implemented by the City of Albuquerque Public Works Department.
- When voluntary and mandatory drought response measures are in place, public education and "how-to" information will be increased.
- The public will be informed of drought stages and how saving water in one stage may prevent further and more stringent drought stages.
- A "Drought Index" will be created to dove-tail with the "Water Drop" program to help inform the public about the severity of the situation at each stage of drought.
- Large users or users not responding to drought restrictions may be targeted for reductions in use through one-on-one outreach and education.
- The Public Works Department will monitor water savings after drought stages have been implemented to assess if the measures taken achieve the target savings levels. Drought response measures can be re-packaged as necessary to achieve target savings.
- An increase in water waste enforcement staff may be needed. Enforcement officers can be re-directed from existing staff or through temporary employment.
- The Strategy also calls for the City to be subject to drought response measures. Such demonstration of effort and accountability will help the credibility and effectiveness of the public outreach for drought response compliance.
- Efforts toward long-term conservation measures will continue, including reviewing and revising (as needed) the building and landscape codes to promote water conservation.
- The Public Works Department will report to the City Council each March or April about the probability of drought conditions for that summer and fall.
- Public Works Department will evaluate the Drought Management Strategy at least every 5 years. Significant modifications would be submitted to the Council for approval.
- The percentage reduction provided in the tables of this report are based on the current pumping demand of 115,00 acre-feet per year. As population and demand increases, pumping is likely to increase – and so will the chances for damaging the aquifer. At the same time, the target savings of 10,000 to 30,000 acre-feet will be divided among more customers, possibly changing the calculations. The modifications needed to reflect these and other changes would be made in the 5-year evaluations.

APPENDIX A

CITY of ALBUQUERQUE
FOURTEENTH COUNCIL

COUNCIL BILL NO. R-137 ENACTMENT NO. 4-2001

SPONSORED BY: Mike McEntee

RESOLUTION

ESTABLISHING A TASK FORCE TO DEVELOP A DROUGHT MANAGEMENT STRATEGY FOR THE CITY OF ALBUQUERQUE TO BE PRESENTED TO THE CITY COUNCIL BY APRIL 1, 2001.

WHEREAS, drought is a common occurrence in New Mexico; and

WHEREAS, drought commonly results in a reduction in availability of surface water and an increase in the usage of both surface and ground water; and

WHEREAS, the adopted "Albuquerque/Bernalillo County Comprehensive Plan requires that "The water resources of the metropolitan area shall be managed to ensure permanent adequate supply;" and

WHEREAS, in March of 1995 the City adopted a Water Conservation Strategy, including a goal to reduce per capita water use by 30% by 2005; and

WHEREAS, the City adopted a Resource Management Strategy in 1997 that calls for use of the City's surface water for drinking water purposes by 2004; and

WHEREAS, the State of New Mexico has requested that all communities in the state develop strategies to respond to state declaration of drought conditions; and

WHEREAS, an adopted Drought Management Strategy is a criterion for submission of any additional requests for diversion from the Office of the State Engineer.

BE IT RESOLVED BY THE COUNCIL, THE GOVERNING BODY OF THE CITY OF ALBUQUERQUE:

Section 1. That a Drought Management Strategy be developed for the City of Albuquerque.

Section 2. That a Drought Management Task Force be created to develop and finalize this Drought Management Strategy. This Drought Management Task Force will include representatives of the Water Resources Division of the Public Works Department and the Albuquerque Economic Development Office, as well as the League of Women Voters, the Sierra Club, the Economic Forum, the Chamber of Commerce, the Hispano Chamber of Commerce, the Utility's Customers' Advisory Committee, and the Middle Rio Grande Council of Governments Water Board. Additional members will be added as needed. The Task Force will be staffed by the Water Resources Division of the Public Works Department.

Section 3. That the Drought Management Strategy will include four different levels of measures that will apply when certain thresholds related to precipitation, surface water availability, and conservation program progress are reached. The four different levels will include increasingly stringent measures to reduce demand on the City's municipal water system.

Section 4. That the Drought Management Strategy recognize and coordinate with the state of New Mexico's recommendations regarding "Water Conservation Guidelines for Public Water Supply," to the extent practical, such as:

(A) A four-phased approach consisting of:

1) Advisory/voluntary conservation,

2) Watch/mandatory conservation,

3) Warning/mandatory conservation, and

4) Emergency/rationing.

(B) Determination of how measures will be implemented and by whom.

Section 5. Water Resources Division of the Public Works Department will prepare three draft drought management strategies prior to the first hearing of the task force.

Section 6. That the Drought Management Strategy be presented to the City Council by April 1 of 2001. In order to meet this deadline, participating agencies and organizations will be expected to select their representatives by the end of December, 2000. While meetings will be scheduled at the

convenience of Task Force members, meetings will proceed without full attendance when necessary.

PASSED AND ADOPTED THIS 4TH DAY OF DECEMBER, 2000
BY A VOTE OF: 9 FOR 0 AGAINST.

APPROVED THIS 10TH DAY OF JANUARY, 2001
By Jim Baca, Mayor

Appendix B
Current and Proposed Water Conservation Program Measures

Demand reduction measures that have been in force through the Water Conservation Program prior to adoption of a Drought Management Strategy and as of this date are planned to remain in force in the future are shown below. In addition, measures that will be submitted to the City Council for approval as of the date of this report are listed.

Current Voluntary Conservation Program Measures

Toilet rebate program initiated – November 1995
Xeriscape rebate program initiated – September 1996
Amount of rebates increased – December 2000
Residential audit / retrofit program initiated– October 1996
ICI audit program initiated – February 1999
Washing machine rebate initiated – September 2000
New, more readable water bill format with messages initiated – January 1995
Marketing initiated – June 1994
Water Watch initiated – May 1999
Education begun – early 1994
Education FTE position established – 1995
First water conservation awards presented – 1995
Water harvesting seminars / manual / promotion initiated – 1998

Current Mandatory Conservation Program Measures

- Surcharge (21 cents per unit) on excess summer usage - 1978
- Threshold lowered to 200% (from 400%) of winter average, June 1994
- Water waste prohibited - 1976
- Enforced through escalating assessments to water bill - March 1995
- Low flow fixtures required in new residential development – July 1992
- Executive Order requiring reduction of City government water use – October 1994
- Design restrictions for landscaping and medians initiated – March 1995
- Water budgets for parks and golf courses initiated (Surcharge for any usage above allowable inches per year)– March 1995
- Grass limited to 20% of landscaped area for **all** new development – October 1995
- Mayoral call for 5% reduction for all City Departments within year – FY07
- Large Users Ordinance (requiring conservation plans for customers using over 50,000 gallons per day) adopted – August 1998
- Sprinkler irrigation of turf prohibited between 10:00 A.M. and 6:00 P.M. – April 2000

- Restaurants prohibited from serving water unless requested – December 2000
- Lodging facilities required to display signs promoting multiple day use of linens – December 2000

Proposed Water Conservation Program Measures

An increase in water waste fees was a component of the water conservation initiatives of 2000. Below is a table showing the current fees and the fees now being considered for adoption by the City Council.

	Current	Proposed
First observed violation	$20	$20
Second observed violation	$50	$50
Third observed violation	$100	$100
Fourth observed violation	$100	$150
Fifth observed violation	$100	$200
Sixth observed violation	$200	$300
Seventh observed violation	$200	$400
Eighth observed violation	Flow restrictor	$500 with an irrigation flow restrictor, or $1,000

As part of a proposed package of future water conservation initiatives, the summer surcharge may be recommended to increase to encourage reduction of summer outdoor use [e.g., from $0.21 to $0.48 cents per unit (748 gallons)].